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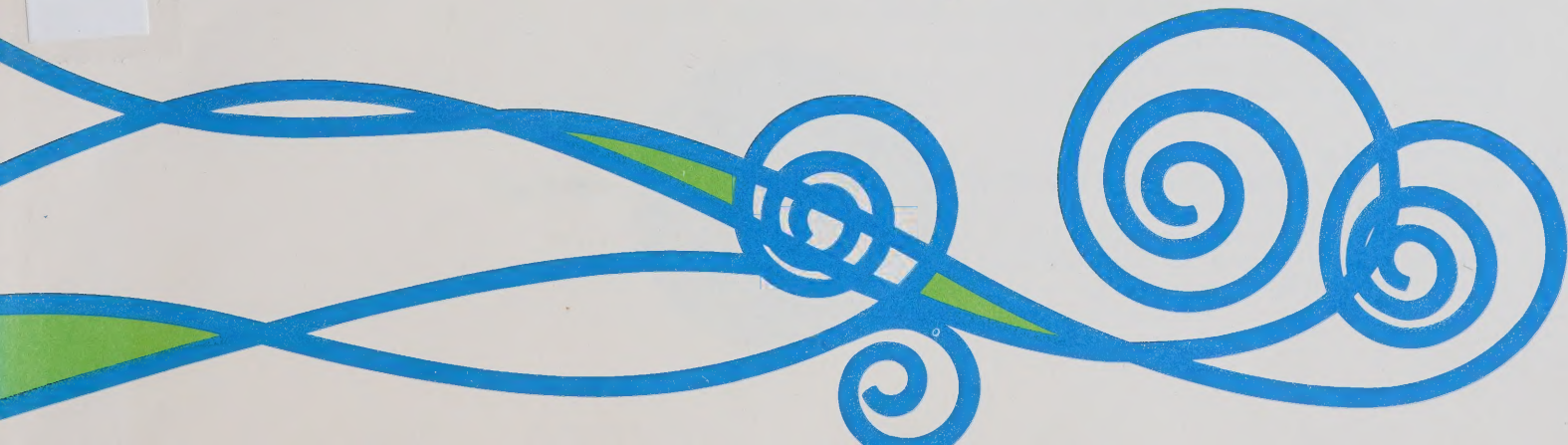
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Intertidal Life

Pacific Rim National Park



Sometimes Land —

Sometimes Sea

When next between the tides you wander
The many tide-pool lives to ponder
Remember this, where'er you go
That life, like tide, ebbs to and fro
And whether beach or woodland greet you
Creatures wild will always meet you —

Will you be their friend



or foe?

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The Pacific Ocean!

Here at the continent's edge, the rolling surf heralds the world's largest ocean. Fluctuating as much as 14 feet between high and low levels, the tides surge up and down. This twice-daily cycle is powered by the tug of the moon, tuned by coastal configurations, and refined by the sun's position and local weather conditions.

With its white fingers of foam gliding silently up the beach sands, the Pacific beckons. As the icy brine retreats, a unique opportunity awaits, for now it's possible to actually enter that fascinating area between the tides. Take an hour or two to explore it, and you will discover that the intertidal area is a special place, worthy of preservation. By leaving the plants and animals (including starfish) undisturbed, you can help to keep it in its natural state.

Think for a moment, and consider the hazards of this intertidal zone. Dramatic changes in temperature, light, salinity, pressure, and oxygen content occur about every six hours. Waves striking the shore with a force of up to 25 tons a square yard threaten to destroy all life. Yet, living things persist on every available space, growing even on each other!

Small wonder then, that life here looks so strange, for these plants and animals have been shaped by surroundings much different than our own. A close look may show how each of them is able to eke out an existence in this area which is sometimes land, sometimes sea. Come and meet some of the most common plants and animals of the exposed rocks and sandy beaches . . .

Briny Tapestries

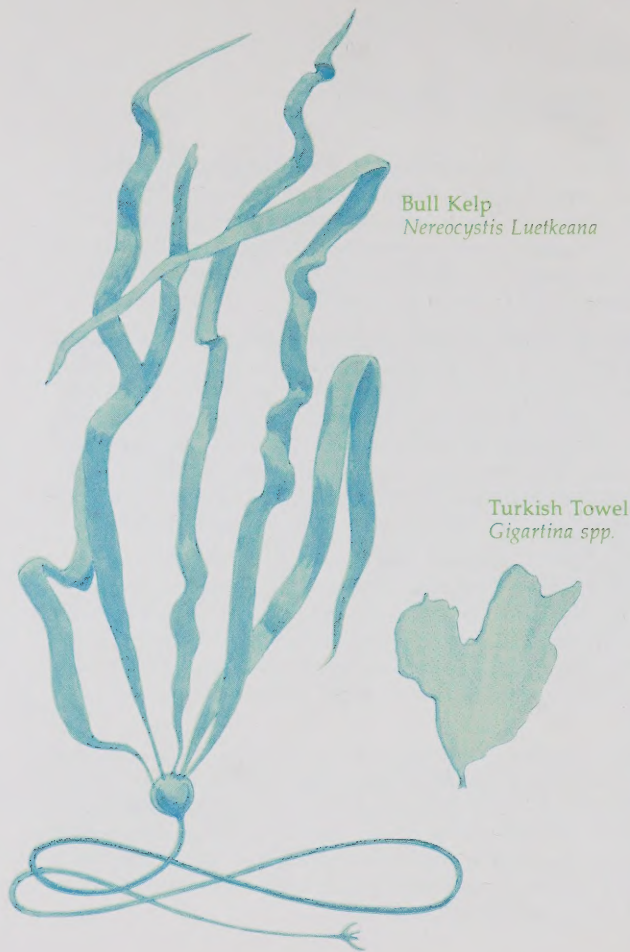
Beyond the water's edge, a thousand living ribbons of kelp are combed as each wave sweeps shoreward; beneath the tide-pool's tranquil surface, golden rays of sunlight filter down through their outstretched palms. Abandoned by the ocean's retreat, a tangle of seaweed reclines on rock and sand.

The rising tide will soon elevate the large kelps to their rightful stature as giants of the marine forests. One of the world's largest seaweeds, *bull kelp*, can often be seen bobbing in the swells near the rocky shores. Characteristic of all marine algae, it is made up of three main parts. You can easily identify these at the huge piles of bull kelp which wash up on the beach. Stronger than any anchor its size, the aptly named *holdfast* grasps the rocky bottom with a mass of tangled fingers. From this, the tapered *stipe* or stem, extends perhaps 80 feet to the surface, where a score of flattened *blades* radiate from a single bulbous float.

Close to the tide's lowest level, the *sea palm* protrudes from the rocks like a rubbery palm tree. Resembling a strip of maroon terry cloth, *Turkish towel* is often woven into the line of flotsam that marks the tide's upper edge.

Like most land plants, seaweeds contain chlorophyll, a green pigment vital to the food-producing process called photosynthesis. Without sunlight, this process cannot function. Structures such as air bladders, which float the seaweeds up toward the light, are thus valuable adaptations.

In the green algae, the chlorophyll is obvious, but in the other two families of large seaweeds, brown algae and red algae, the green colour is obscured by pigments of brown and red.



Bull Kelp
Nereocystis Luetkeana

Turkish Towel
Gigartina spp.

How often have you been told that seaweeds are slimy, smelly and ugly? Discover the truth yourself! As you wander between the tides, this glistening collage invites investigation. Pet a seaweed — it's not harmful to touch — feel its slippery-clean surface, smell its briny tang! Like any plant or animal, seaweeds decay after dying. Perhaps their bad reputation arose from people who had never ventured beyond the high tide line to see, to touch, to smell their delicate living beauty.

Ocean Asteroids

Surpassing the rainbow's brightest hues, *sea stars* visually announce their presence to all. Their outstanding shape and colour proclaim them jewels of the coast. Although commonly called starfish, they are not fish at all, but members of a group of animals called *echinoderms*, which means "spiny skinned." Run your finger along the back of one and feel the rigidity of the white spines. Other echinoderms you may find here are the *sea urchin*, the *sand dollar* and the *sea cucumber*.

The sea star's body radiates outward from the centre, like the spokes of a wheel, in a pattern called *radial symmetry*. To echinoderms, left and right have no meaning! Most sea stars have five arms, but the soft-bodied *sunflower star*, often seen in sandy or muddy areas, has as many as 24.

Sea stars move by means of a system of interconnected tubes and canals filled with sea water. A light-coloured disc near the centre of the star's back, called a *madreporite*, regulates the amount of water in this system. Gently lift a star from the rock and you will see the other end of this system, the *tube feet*, which resemble hundreds of tiny eyedroppers. Be sure to replace the star where you found it so that it can reattach itself to the rock.

Sunflower Star
Pycnopodia helianthoides



Living Fortresses

Secure in their limestone castles, *acorn barnacles* defy the ocean's onslaught. Their cone-shaped shell splits the force of the mightiest waves.

Closer to the low tide line you may encounter dense clusters of another kind of barnacle, attached to the rock by a rubbery gray and red stalk. Does their shape remind you of the head and neck of a goose? If so, you can envisage how they got the name *goose barnacle*. Another type of goose barnacle with smooth blue-gray plates and a creamy coloured stalk, lives entirely at sea. Logs bearing huge colonies of them are sometimes washed ashore. Like their close relatives, the crabs, shrimps and lobsters, barnacles begin life as free-swimming larvae. As they mature, they develop cement glands and glue themselves to a solid base, establishing a permanent attachment in a pattern of life predestined for them by evolutionary processes.



Goose-neck Barnacles
Mitella polymerus

Dungeness Crab
Cancer magister



Armoured Masters of the Side-Step

Wearing a skeleton on the outside is very useful for protection, but it does cause problems. Members of the crab family thus discard their shells periodically, as they grow larger, and form a new one. The shell is also inhibiting for mating purposes. *Dungeness crabs*, for example, have a complex courtship that coincides with the time the female discards her shell for a new one. A post-mating embrace that may last for two days is part of the process. Observers might qualify these creatures as the Casanovas of the beach.

Marine Delicacies

Among the ocean's offerings, *bivalves* have always been gourmet items. "Bivalve" means "two shells" and it refers to some of the best-known morsels — clams, mussels and oysters. These animals feed on microscopic bits of food filtered from sea water that they circulate through their body cavities.

Along the sandy beach you may notice delicate rills carved around the golden oval of a thin flattened shell. One of the valves or shells of a *razor clam* has been cast up from the sands near the low tide line. Because the shells are so fragile, they are often broken or separated. Long before man appeared on this planet, razor clams were able to survive the pounding surf by their digging ability. They can bury themselves completely in less than 10 seconds!

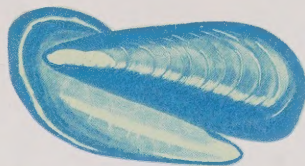
It is impossible to overlook the *blue mussels* growing in dense beds of several thousand individuals. Wiggle one and note the thin black *byssal threads* by which it is held in place. Mussel beds provide places to live for dozens of other animals and plants. Look closely and you're sure to notice some of them.

The *Pacific oyster* cannot survive on the outer coast, but it does appear locally in protected waters. Originally transplanted from Japan early in this century, it has attained commercial importance in the Strait of Georgia.

Red Tide

Certain microscopic organisms in the ocean at times become so abundant that the sea attains a reddish cast, called *red tide*. As they feed, clams, mussels and oysters accumulate the toxin of these organisms. Persons who eat

bivalves containing this toxin may be poisoned. Though notices are usually posted warning of the red tide dangers, visitors should check around before eating these seafoods. Regulations also limit the number and size of clams, crabs and oysters which may be taken.



Blue Mussel
Mytilus spp.

Pacific Oyster
Grassostrea gigas



Razor Clam
Siliqua patula



For more detailed information on inter-tidal life, the following are recommended:

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- Ricketts, E. G. 1939, *Between Pacific Tides*, and Calvin, J. Stanford University Press, Stanford, Calif. 4th Ed. (Revised in 1962 by J. W. Hedgpeth.)



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